

UNITED STATES PATENT OFFICE.

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METHOD OF COATING ARTICLES.

No Drawing.

Application filed July 7, 1922. Serial No. 573,440.

This invention relates to the method of applying a coating to a smooth surface and especially to a vitreous material and more particularly relates to the method of affixing a coating to an incandescent-electric-lamp bulb.

One of the objects of the invention is to provide a method of expeditiously and efficiently applying a coating to a bulb.

Another object is to apply a coating comprising a plurality of layers.

A further object is to prepare a bulb for treatment so that a coating applied thereto will immediately set.

Other objects and advantages will be apparent from the following description.

Although the present method may have general application, it is particularly adapted for use in connection with the process of coating lamps in which a coating is sprayed upon the lamp by a compressed fluid, such as air.

In the use of incandescent lamps, especially those of high intensity, it is very often desirable, under various conditions, to diffuse the emanating light rays. Various expedients have been employed for accomplishing this result, as, for instance, by the disposition of a translucent screen between the light source and the user, or the intensity of the light may be directly controlled by frosting or etching the bulb or by applying thereto a superficial coating of a preparation such as an enamel or the like. Certain difficulties have been encountered in the production of a suitable preparation that would adhere to the bulb of a lamp and be resistant to heat and to the solvent action of water.

An example of a coating which, however, meets the requirements essential to the efficient coating of a bulb may be found in co-pending application to Aaron M. Hageman and Albert F. Lindstrom, Serial No. 608,772 filed December 23, 1922 and assigned to Westinghouse Lamp Company and the present method aims to improve the method of applying the coating as set forth in this application and in connection with other coatings.

The above mentioned application consists of a compound which includes such coloring pigments and other materials as may pro-

vide a translucent surface which may be applied to a lamp bulb. As set forth in that application, the enamel may be prepared by mixing suitable amounts of powdered kaolin with a solution of sodium silicate and then placing this mixture in a ball-milling mixer and operating the mixer for a given period to produce a fluid of a suitable consistency. Various modifications of this mixture may be made to meet coloring and light-diffusing requirements of a lamp.

The mixture is preferably applied to a bulb by means of a spray gun in which air under pressure is employed to drive or spray the fluid upon the surface to be coated or enameled, after which the coated surface is subjected to a heat treatment for a given period for the purpose of affixing the coating to the surface. The coating is next subjected to the application of a suitable heated setting solution of a neutral salt such as ammonium chloride which will effect the necessary chemical reaction to render the coating insoluble in water. The setting solution may, however, be applied cold if desirable, in which case the bulbs may be passed through a heat zone. The bulbs are then washed and finally dried by passage through an oven.

Although the above process provides for the efficient and uniform coating of bulbs, it has been found desirable to provide for the more rapid application of the coating, that is, to coat a given number of bulbs in a relatively small amount of time and this is accomplished in the present invention by pre-heating the bulbs and applying the coating to the heated surfaces. It has been found that a coating, as, for example, the one briefly outlined above will set more quickly when applied to a warm surface and in practice such a coating hardens or sets instantaneously upon striking the heated surface.

Furthermore, a coating material which is sprayed upon the bulb strikes it in a series of successive deposits, each deposit forming a very thin layer and, since, as stated, the particles set immediately, the continued application of the material by means of the spray causes a coating of any desired thickness or density to be built up. The building up of the coating may be construed to mean the depositing of a plurality of layers which

are applied in rapid succession and each layer, although a separate entity when applied, ultimately contributes to the production of a coating of a thickness depending upon the temperature to which the bulb is heated and to the manipulation of the spray gun.

By this method, a very desirable coating is produced, inasmuch as it is well known that a more satisfactory sheen or luster is produced in coatings which are formed by the application of several layers, one upon the other, but, heretofore, the time consumed by this operation was prohibitive by reason of the time consumed. By pre-heating the surface to be coated, a bulb may be sprayed and a coating of a plurality of layers produced in a time interval of approximately one-half that which was heretofore necessary to apply to the usual single layer of material of the same thickness.

It is obvious, that coatings of various degrees of translucency may be applied to lamps to meet different lighting conditions and where colored coatings are desirable it is a commercial advantage to be able to produce a coating having easily controlled degrees of density of shades or tones of color. This control has been difficult to obtain particularly when employing certain colors, such as blue or green in which the pigments themselves have very little covering power or depth of color. In such cases, it is possible, according to the present invention, by raising the pre-heating temperature, for instance, to the range of 100° to 150° C. and manipulating the spray gun, to build up the coating very rapidly, and, in relatively short time, produce a deep rich color equal to that which was heretofore only attainable by the application of several independent relatively thick coatings at the cost of an excessive amount of time.

Another advantage derived from the present method resides in the uniformity of the coating, irrespective of the weather conditions. Heretofore, it has taken a longer time interval to coat a lamp properly on days when the atmosphere contained a relatively high degree of moisture than the time the same operation consumed on dry days. This condition arose from the fact that, on moist days the difference in temperature between the bulbs and the atmosphere results in the accumulation of a layer of moisture or condensate upon the bulbs which, when the coating was applied, produced a diluted substance which would run or flow over the surfaces of the bulbs. Therefore, the time necessary to sufficiently dry out the coating on moist days was considerably increased. This contingency greatly reduced the production, whereas, by pre-heating the lamps, as in the present method, the number of lamps coated per minute remains constant, irrespective of

meteorological conditions and, as has been stated, is approximately twice that possible by the method used heretofore.

It has also been found advantageous to heat the air employed for ejecting the fluid from the spray gun, or the coating material may be heated prior to its discharge from the spray gun and, when heated, may either be applied to a cool surface or to a surface that has been pre-heated.

In practicing the present method, a lamp to be coated may be pre-heated to a given temperature in any desired manner. For example, the lamp may be subjected to a blast of heated air. A coating as, for example, that set forth in the above mentioned co-pending application, is then preferably sprayed upon the surface of a lamp which is passed into a heat zone for a dehydrating treatment after which the setting solution is applied to the coating, then the bulb is passed through a second heat zone for drying. The bulb may then be washed and subsequently dried by passage through a heat zone.

Although the above description relates particularly to the treatment of electric incandescent lamps, it is to be understood that the method has other applications as, for instance, it may be employed for the treatment of objects such as reflectors, globes, or the like.

What is claimed is:

1. The method of applying a silicate coating to a light diffusing vitreous object which comprises heating the object and spraying the coating thereon while the object is still heated.
2. The method of applying a silicate coating to a light diffusing vitreous object which comprises subjecting the object to a blast of heated air and projecting the coating in a divided state against the object.
3. The method of coating a vitreous incandescent electric lamp bulb which comprises heating said bulb, spraying a silicate coating thereon and in subsequently heating the coated object to dehydrate the coating.
4. The method of applying a silicate coating to an incandescent electric lamp bulb which comprises subjecting the bulb to a blast of heated air to bring it to a predetermined temperature, spraying a coating upon the heated bulb and passing the coated bulb through a heat zone.
5. The method of applying a silicate coating to an incandescent electric lamp bulb which comprises heating the coating material spraying said heated coating upon said bulb and in passing the coated bulb through a heat zone.
6. The method of coating an incandescent electric lamp bulb with a silicate coating which comprises heating air under pressure and driving the coating material against the object by said air.

7. The method of coating an incandescent electric lamp bulb with a silicate coating which comprises heating air, driving the coating against the bulb by said air and in passing the coated object through a heat zone.

8. The method of coating an incandescent electric lamp bulb with a silicate coating which comprises heating the coating and in driving said heated coating in a finely divided state against the bulb and in passing said coated bulb through a heat zone.

9. The method of coating an incandescent electric lamp bulb with a silicate coating which consists in heating the bulb and applying the coating thereto by spraying while the bulb is still warm to deposit a plurality of layers of said coating upon the bulb.

10. The method of applying a silicate coating of a given density to an incandescent electric lamp bulb which comprises heating the bulb to a predetermined temperature and in spraying the coating material upon said bulb while the same is still warm to deposit a plurality of layers of said material upon the bulb.

11. The process of affixing a coating to a silicious article comprising heating the article, spraying thereon a preparation containing a soluble silicate, subjecting the article to heat and applying a heated solution of

at least one substance which reacts with the sodium silicate to form an insoluble compound.

12. The process of affixing a coating to silicious articles comprising heating the articles applying thereto a preparation containing a soluble silicate, baking said applied preparation, applying a hot solution capable of reacting with the silicate, rinsing said articles and subsequently drying the same.

13. The process of affixing a coating to silicious articles comprising heating the articles, applying thereto a preparation having sodium silicate as one of its ingredients, baking said preparation, treating said baked preparation with a setting solution and heating to cause a reaction with the sodium silicate.

14. The process of affixing a coating to silicious articles comprising heating the articles, applying thereto a preparation including a filler and sodium silicate, baking said preparation and applying a second preparation to react with the sodium silicate for the formation of an insoluble compound.

In testimony whereof, I have hereunto subscribed my name this 6th day of July 1922.

ALBERT FERDINAND LINDSTROM.